



1645  
# 10

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Group Art Unit: 1645

John SantaLucia, Jr. et al.

Examiner:

Serial No.: 09/876,549

Filed: June 7, 2001

For: METHOD AND SYSTEM FOR PREDICTING NUCLEIC  
ACID HYBRIDIZATION THERMODYNAMICS AND  
COMPUTER-READABLE STORAGE MEDIUM FOR USE  
THEREIN

Attorney Docket No.: WSU 0192 PUSP

RECEIVED  
DEC 10 2001  
TECH CENTER 1600/2900

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
United States Patent and Trademark Office  
Washington, D.C. 20231

Sir:

In compliance with the duty of disclosure under 37 C.F.R. § 1.56 and § 1.97-1.98, the references listed and identified on the attached Forms PTO/SB08A and PTO/SB08B are being submitted herewith for consideration by the Examiner.

While this Statement is being filed in compliance with the duty of disclosure, citation of the attached references is not to be construed as an admission that any of the reference(s) are "material" as defined under 37 C.F.R. § 1.56(b).

**CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8**

I hereby certify that this paper, including all enclosures referred to herein, is being deposited with the United States Postal Service as first-class mail, postage pre-paid, in an envelope addressed to: Commissioner for Patents, United States Patent and Trademark Office, P.O. Box 2327, Arlington, VA 22202 on:

12-3-2001  
Date of Deposit

David R. Syrowik  
Name of Person Signing

[Signature]  
Signature

A copy of each reference listed on the attached Forms PTO/SB08A and PTO/SB08B is included herewith. The following patents and publications have been identified as the most pertinent references:

1. U.S. Patent No. 5,593,834 to Lane et al.
2. U.S. Patent No. 6,027,884 to Lane et al.
3. U.S. Patent No. 6,251,588 to Shannon et al.
4. ALLAWI, H.T., ET AL., Thermodynamics and NMR of Internal G-T Mismatches in DNA, Biochemistry, 36, 1997, pgs. 10581-10594.
5. ALLAWI, H.T., ET AL. Thermodynamics of Internal CT Mismatches in DNA, Nucleic Acids Res., 26, 1998, Pgs. 2694-2701.
6. BOMMARITO, S., ET AL., Thermodynamic Parameters For DNA Sequences With Dangling Ends, Nucleic Acids Res., 28, 2000, pgs. 1929-1934.
7. MATTHEWS ET AL. Expanded Sequence Dependence of Thermodynamic Parameters Improves Prediction of RNA Secondary Structure. J. Mol. Biol., 288, 1999, pgs. 911-940.
8. PEYRET, N., ET AL., Nearest-Neighbor Thermodynamics and NMR of DNA Sequences with Internal AA,CC,GG, and TT mismatches. Biochemistry, 38, 1999, pgs. 3468-3477.
9. SANTALUCIA J., JR., ET AL. Improved Nearest-Neighbor Parameters for Predicting DNA Duplex Stability. Biochemistry, 35, 1996, pgs. 3555-3562.

10. SANTALUCIA J., JR. A Unified View of Polymer, Dumbbell, and Oligonucleotide DNA Nearest-Neighbor Thermodynamics. Proc. Natl. Acad. Sci. USA, 1998 95, pgs. 1460-1465.

11. XIA T., ET AL. Thermodynamic Parameters for and Expanded Nearest-Neighbor Model for Formation of RNA Duplexes with Watson-Crick Base Pairs, Biochemistry, 37, 1998, pgs. 14719-14735.

Consideration and entry into the record of these references is respectfully requested.

Respectfully submitted,

John SantaLucia, Jr. et al.

By: 

David R. Syrowik

Reg. No. 27,956

Attorney/Agent for Applicant

Date: December 3, 2001

**BROOKS & KUSHMAN P.C.**

1000 Town Center, 22nd Floor  
Southfield, MI 48075

Phone: 248-358-4400

Fax: 248-358-3351

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for Form 1449A/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(use as many sheets as necessary)*

**Complete if Known**

<div style="text-align: right;">RECEIVED</div> <div style="text-align: center;"> <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>   <i>(use as many sheets as necessary)</i> </div>				<b>Complete if Known</b>	
				<b>Application Number</b>	09 / 876 , 549
				<b>Filing Date</b>	June 7 , 2001
				<b>First Named Inventor</b>	John SantaLucia, Jr.
				<b>Group Art Unit</b>	1645
				<b>Examiner Name</b>	
Sheet	1	of	1	<b>Attorney Docket Number</b>	WSU 0192 PUSP

## U.S. PATENT DOCUMENTS

[illegible]

## FOREIGN PATENT DOCUMENTS

[illegible]

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.

<sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.



<b>Substitute for Form 1449B/PTO</b>  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)			<b>Complete if Known</b>		
			<b>Application Number</b>	09/876,549	
			<b>Filing Date</b>	June 7, 2001	
			<b>First Named Inventor</b>	John SantaLucia, et al.	
			<b>Group Art Unit</b>		
			<b>Examiner Name</b>		
<b>Sheet</b>	1	<b>of</b>	4	<b>Attorney Docket Number</b>	WSU 0192 PUS

**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

Examiner Initials *	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	
		ALLAWI, H.T., ET AL., Thermodynamics and NMR of Internal G-T Mismatches in DNA, Biochemistry, 36, 1997, pgs. 10581-10594.	✓
		ALLAWI, H.T., ET AL., Nearest-Neighbor Thermodynamic Parameters For Internal GA Mismatches in DNA, Biochemistry, 37, 1998, Pgs. 2170-2179.	✓
		ALLAWI, H.T., ET AL., Nearest-Neighbor Thermodynamics of Internal AC Mismatches in DNA: Sequence Dependence and pH Effect, Biochemistry, 37, 1998, pgs. 9435-9444.	✓
		ALLAWI, H.T., ET AL. Thermodynamics of Internal CT Mismatches in DNA, Nucleic Acids Res., 26, 1998, Pgs. 2694-2701.	✓
		ANATO, ET AL., Thermodynamic Parameters for Loop Formation in RNA and DNA hairpin tetraloops, Nucleic Acids Res. 20, 1991, pgs. 819-824.	✓
		BASHIR, M.S., ET AL., In Situ Hybridization For The Identification of Helicobacter Pylori In Paraffin Wax Embedded Tissue, J. clin. Pathol., 9, 1994, pgs. 862-864.	✓
		BLAKE, ET AL., Statistical mechanical simulation of polymeric DNA melting with MELTSIM, Bioinformatics, 15, No. 5, 1999, pgs. 370-375.	✓
		BLOMMERS, ET AL., Effects of Base Sequence on the Loop Folding in DNA Hairpins, Biochemistry 28, 1989, pgs. 7491-7498.	✓
		BOMMARITO, S., ET AL., Thermodynamic Parameters For DNA Sequences With Dangling Ends, Nucleic Acids Res., 28, 2000, pgs. 1929-1934.	✓
		BRESLAUER, K.J., ET AL. Predicting DNA Duplex Stability from the Base Sequence. Proc. Natl. Acad. Sci. U.S.A., 83, 1986, pgs. 3746-3750.	✓
		CHEN, H. and Zhu G. Computer Program For Calculating The Melting Temperature Of Degenerate Oligonucleotides Used In PCR Or Hybridization. BioTechniques, 22, 1997, pgs. 1158-1160.	✓
		DOPAZO, J., ET AL. Design Of primers for PCR amplification of highly variable genomes. CABIOS, 9, 1993, pgs. 123-125.	✓

<b>Examiner Signature</b>		<b>Dat Consid red</b>	
-------------------------------	--	---------------------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Unique citation designation number. <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached.



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)			<b>Complete if Known</b>		
			Application Number	09/876,549	
			Filing Date	June 7, 2001	
			First Named Inventor	John SantaLucia, et al.	
			Group Art Unit		
Sheet	2	of	4	Examiner Name	
				Attorney Docket Number	WSU 0152

**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

Examiner Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number, publisher, city and/or country where published.	
		FEREA, T.L., ET AL. Systematic Changes in Gene Expression Patterns Following Adaptative Evolution in Yeast. Proc. Natl. Acad. Sci. U.S.A., 96, 1999, pgs. 9721-9726.	✓
		FODOR, S.P.A., ET AL. Multiplexed Biochemical Assays with Biological Chips. Nature, 364, 1993, pgs. 555-556.	✓
		FOTIN, A.V., ET AL. Parallel thermodynamic analysis of duplexes on oligodeoxyribonucleotide microchips. Nucleic Acids Res., 26, 1998, pgs. 1515-1521.	✓
		FREIER, S.M., ET AL. Improved Free-energy Parameters for Predictions of RNA Duplex Stability. Proc. Natl. Acad. Sci. U.S.A., 83, 1986, pgs. 9373-9377.	✓
		GALL, J.G. and Pardue m.L. Formation and Detection of RNA-DNA hybrid Molecules in Cytological Preparations. Proc. Natl. Acad. Sci. U.S.A., 63, 1969, pgs. 378-383.	✓
		GRAY, D. Derivation of Nearest-Neighbor Properties from Data on Nucleid Acid Oligomers. I. Simple sets of Independent Sequences and the Influence of Absent Nearest Neighbors, Biopolymers, 42, 1997, pgs. 783-793.	✓
		GRAY, D. Derivation of Nearest-Neighbor Properties from Data on Nucleid Acid Oligomers. II. Thermodynamic Parameters of DNA-RNA Hybrids and DNA, Biopolymers, 42, 1997, pgs. 795-810.	✓
		HAAS, S., ET AL. Primer design for large scale sequencing. Nucleic Acids Res., 26, 1998, pgs. 3006-3012.	✓
		HILLIER, L. and Green P. OSP: a computer program for choosing PCR and DNA sequencing primers. PCR Methods Appl, 1, 1991, pgs. 124-128.	✓
		HYNDMAN, D., ET AL. Software to Determine Optimal Oligonucleotide Sequence Based on Hybridization Simulation Data. Biotechniques, 20, 1996, pgs. 1090-1097.	✓
		KADRMAS et al. Relative stabilities of DNA three-way, four-way and five-way junctions (multi-helix junction loops): unpaired nucleotides can be stabilizing or destabilizing. Nucleic Acids Res., 23, 1995, pgs. 2112-2122.	✓

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Unique citation designation number. <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached.

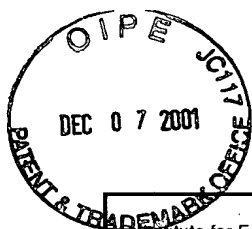


Substitute for Form 1449B/PTO  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)			Complete if Known		
			Application Number	09/876,549	
			Filing Date	June 7, 2001	
			First Named Inventor	John SantaLucia, et al.	
			Group Art Unit		
			Examiner Name		
Sheet	3	of	4	Attorney Docket Number	WSU 0152, JSP
<b>OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS</b>					
Examiner Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.			
		KE ET AL. Influence of Neighboring Base Pairs on the Stability of Single Base Bulges and Base Pairs in a DNA Fragment, Biochemistry, 34, 1995, pgs. 4593-4600. ✓			
		KIERZEK, R., ET AL. Thermodynamics of Single Mismatches in RNA Duplexes. Biochemistry, 43, 1999, pgs. 14214-14223. ✓			
		LADBURY ET AL. Thermodynamics of Formation of a Three-Strand, DNA Three-Way Junction Complex, Biochemistry, 33, 1994, pgs. 6828-6833. ✓			
		LEONTIS ET AL. Stability and Structure of Three-Way DNA Junctions Containing Unpaired Nucleotides, Nucleic Acids Res., 19, 1991, pgs. 759-766. ✓			
		MATTHEWS ET AL. Predicting Oligonucleotide Affinity to Nucleic Acid Targets, RNA, 5, 1999, pgs. 1458-1469. ✓			
		MATTHEWS ET AL. Expanded Sequence Dependence of Thermodynamic Parameters Improves Prediction of RNA Secondary Structure, J. Mol. Biol., 288, 1999, pgs. 911-940. ✓			
		OWCZARZY, R ET AL. Predicting Sequence-Dependent Melting Stability of Short Duplex DNA Oligomers, Biopoly 44, 1997, pgs. 217-239. ✓			
		PESOLE G., ET AL. Gene Up: A program to Select Short PCR Primer Pairs that Occur in Multiple Members of Sequence Lists. Biotechniques, 25, 1998, pgs. 112-123 ✓			
		PEYRET, N., ET AL. Nearest-Neighbor Thermodynamics and NMR of DNA Sequences with Internal AA,CC,GG, and TT mismatches. Biochemistry, 38, 1999, pgs. 3468-3477. ✓			
		POLLAMEN, R., ET AL. Detection of Human Papillomavirus by non Isotopic in situ Hybridization in Condylomatous and CIN Lesions. Journal of Clinical pathology, 46, 1993, pgs. 936-939. ✓			

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

<sup>1</sup>EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Unique citation designation number. <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached.



<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)			<b>Complete if Known</b>		
			Application Number	09/876,549	
			Filing Date	June 7, 2001	
			First Named Inventor	John SantaLucia, et al.	
			Group Art Unit		
			Examiner Name		
Sheet	4	of	4	Attorney Docket Number	WSU 0152 P22P

RECEIVED  
DEC 10 2001  
TECH CENTER 1600/2900

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	
		PROUTSKI, V., and Holmes E.C. Primer Master: a new program for the design and analysis of PCR primers. CABIOS, 12, 1996, pgs. 253-255.	A
		RYCHLIK W. and Rhoads R.E. A computer program for choosing optimal oligonucleotides for filter hybridization, sequencing and in vitro amplification of DNA. Nucleic Acids Res., 17, 1989, pgs. 8543-8551.	X
		SAIKI R.K., ET AL. Primer-directed Enzymatic Amplification of DNA with a Thermostable DNA Polymerase. Science, 239, 1988, pgs. 487-494.	X
		SANTALUCIA J., JR., ET AL. Improved Nearest-Neighbor Parameters for Predicting DNA Duplex Stability. Biochemistry, 35, 1996, pgs. 3555-3562.	X
		SANTALUCIA J., JR., ET AL. Measuring the Thermodynamics of RNA Secondary Structure Formation, Biopoly, 44 1997, pgs. 309-319.	X
		SANTALUCIA J., JR. A Unified View of Polymer, Dumbbell, and Oligonucleotide DNA Nearest-Neighbor Thermodynamics. Proc. Natl. Acad. Sci. USA, 95, 1998, pgs. 1460-1465.	X
		XIA T., ET AL. Thermodynamic Parameters for and Expanded Nearest-Neighbor Model for Formation of RNA Duplexes with Wathson-Crick Base Pairs, Biochemistry, 37, 1998 pgs. 14719-14735.	X
		WEBER ET AL. Shedding Light on the Dark and Weakly Fluorescent States of Green Fluorescent Proteins, PNAS 96, 1999, pgs. 6177-6182.	X
		ZIEBA ET AL. Differential Hydration of dA-dT Base Pairing and dA and dT Bulges in Deoxyoligonucleotides, Biochemistry, 30, 1991, pgs. 8018-8026.	X
		ZUCKER M. On Finding all Suboptimal Foldings of an RNA Molecule. Science, 244, 1989, pgs. 48-52.	X

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Unique citation designation number. <sup>2</sup>Applicant is to place a check mark here if English language Translation is attached.